Fermi National Accelerator Laboratory
Batavia, IL 60510

LARGE HADRON COLLIDER
COLLARING & KEYING TRAVELER

Reference Drawing(s)
Collared Coil Assembly
ME-369581

Budget Code:	**Project Code:**
Released by:	**Date:** 6/12/01
Prepared by: M. Cullen, J. Larson	

Title	Signature	Date
TD / E&F Process Engineering	Bob Jensen/Designee	6/13/01
TD / LHC Production Supervisor	Jim Kerby/Designee	6/13/01
TD /LHC Production Engineer	Rodger Bossert/Designee	6/13/01
TD / LHC Tooling Engineer	John Carson/Designee	6/13/01
TD / LHC Program Manager	Jim Kerby/Designee	6/13/01

Revision Page

Revision	Step No.	Revision Description	TRR No.	Date
None	N/A	Initial Release	N/A	10/16/00
A	3.0	Modified the Lamination Packs and added Kapton.	1183	6/13/01
	4.0	Removed Strain Gauges		
	5.0	Added Electrical Limits		

1.0 General Notes

1.1 White (Lint Free) Gloves (Fermi stock 2250-1800) or Surgical Latex Gloves (Fermi stock 2250-2494) shall be worn by all personnel when handling all product parts after the parts have been prepared/cleaned as applicable.

1.2 All steps that require a sign-off shall include the Technician/Inspectors first initial and full last name.

1.3 No erasures or white out will be permitted to any documentation. All incorrectly entered data shall be corrected by placing a single line through the error, initial and date the error before adding the correct data.

1.4 All Discrepancy Reports issued shall be recorded in the left margin next to the applicable step.

1.5 All personnel performing steps in this traveler must have documented training for this traveler and associated operating procedures.

1.6 Personnel shall perform all tasks in accordance with current applicable ES&H guidelines and those specified within the step.

1.7 Cover the product/assembly with Green Herculite (Fermi stock 1740-0100) when not being serviced or assembled.

2.0 Parts Kit List

2.1 Attach the completed Parts Kit List for the LHC Collared Coil Keying Traveler to this traveler. Ensure that the serial number on the Parts Kit List matches the serial number of this traveler. Verify that the Parts Kit received is complete.

Process Engineering/Designee

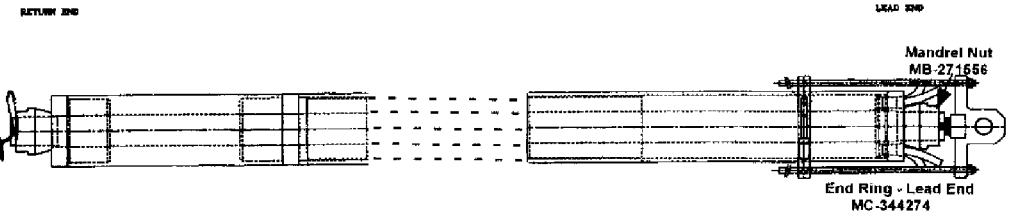
Date 6/12/01

3.0 Collaring

3.1 Clean all Mandrel hardware with Isopropyl Alcohol (Fermi stock 1920-0300) and Heavy Disposable Wipes (Fermi stock 1660-2600) or equivalent.

D Gould — 6/12/01
Technician(s) Date

3.2 Install the Nuts and the Lifting Eye onto the Lead End of the Mandrel.



D Gould — 6/12/01
Technician(s) Date

3.3 Lift vertically with the crane and transport the Collared Coil Assembly to the Keying Press and insert the Collared Coil Assembly into the Keying Press.

D Gould — 6/12/01
Technician(s) Date

3.4 Machine the End Collar Lamination Packs (8) in accordance with the End Pack Modification Drawings (MX-XXXXXX).

T. R. Lee — 6-15-01
Technician(s) Date

3.5 Install the Return End Collar Lamination Packs with 5 mil self adhesive kapton on the Pole Piece side in accordance with the Collared Coil W/O Ends Assembly (ME-369581).

Note(s):

Remove shrink-wrap Mylar in 3" sections to prevent the ground wrap from loosening during collaring.

T. R. Lee — 6-15-01
Technician(s) Date

3.6 Install the Collar Lamination Packs in accordance with the Collared Coil W/O Ends Assembly (ME-369581).

Note(s):

Remove shrink-wrap Mylar in 3" sections to prevent the ground wrap from loosening during collaring.

T. R. Lee — 6-15-01
Technician(s) Date

3.7 Install the Modified Lead End Collar Lamination Packs with 5 mil self adhesive kapton on the Pole Piece side in accordance with the Collared Coil W/O Ends Assembly (ME-369581).

Technician(s) — Date: 6-15-01

3.8 Verify the Lamination Packs are tight and in accordance with the Collared Coil W/O Ends Assembly (ME-369581).

Crew Chief — Date: 6/15/01

Resistance during collaring

Q1	.5757
Q2	.5755
Q3	.5771
Q4	.5778

P1 should be MQXBP1

Needs to be S. Kerby.

MQXBØ1

~~MQXB-01~~

4.0 Keying Procedure

Note(s):

Operate the Press in accordance with the Operating Procedure (OP-333503)
Monitor resistance of the magnet during the entire Collaring Procedure.
Resistance change of no more than 3 mOhms is allowed.

4.1 Massage the Collared Coil Assembly at 900-pump psi. from Lead End to Return End.

Don't try to insert the mandrel nut here

Technician(s) 6/15/01 Date

4.2 Massage the Collared Coil Assembly at 1800 pump psi from Return End to Lead End.

Technician(s) 6/15/01 Date

MAIN ON
KEY ON
MAIN OFF
KEY OFF

4.3 Partially insert Keys from the Lead End to Return End. Use 3000 pump psi main pusher pressure and 700-pump psi Key pusher pressure for this step.

Note(s):

As needed modify the length of the keys 6" above the End of the Assembly to Ensure the final key is > 4" in length.
Verify the Mandrel Nut is hand tight every 4 ft (four times) of Keying.
Engage the Main Pushers, and then the Key Pushers, release the Main Pushers, and then the Key Pushers.

Technician(s) 6/15/01 Date

MAIN TO CENTER
KEY ON
MAIN ON
KEY ON
MAIN OFF
KEY OFF

4.4 Fully insert Keys from the Lead End to Return End. Use 4400 pump psi main pusher pressure and 2700-pump psi Key pusher pressure.

Note(s):

Verify the Mandrel Nut is hand tight every 4 ft (four times) of Keying.
Engage the Main Pushers, and then the Key Pushers, release the Main Pushers, and then the Key Pushers.

Technician(s) 6/15/01 Date

X 4.5 While Lowering and Raising the Coil Assembly, visually inspect Keys to verify they are fully inserted.

MASSAGE KEYS
4700 psi MAIN
3300 psi KEYS

Inspector 6:15:01 Date

4.6 Bring the Collared Coil Assembly horizontal using Approved and Appropriate procedures

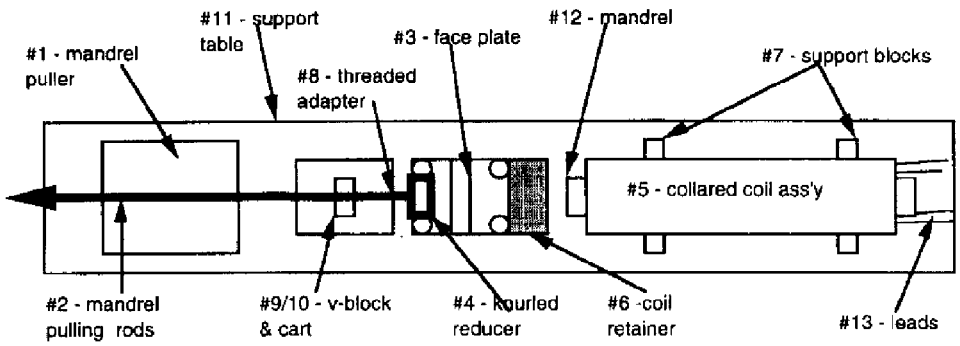
MASSAGE KEYS 3" increments
3000 psi MAIN
3600 psi KEYS

Technician(s) 6/19/01 Date

FINAL MASSAGE
3" inc.
5000 ps. MAIN
4000 psi KEYS

5.0 Pulling the Mandrel

5.1 Mandrel Pulling Procedure



TOP VIEW

Note(s):

Mandrel should be pulled out from return end of Collared Coil Assembly. Ensure that the Mandrel is kept in the correct radial position with respect to coils during extraction by inserting Mandrel into holding tooling (MC-344284) and Collar Laminations into Cradles (MD-344281)

5.1.1 The Mandrel pulling rods (2) are to be picked up by the crane and pushed into the Mandrel Puller (1) until they click into the groove. The rods should be about 6" from the face plate (3). To displace the weight of the rods, a cart (9) with a V block (10) shall be used to support the pulling rods.

5.1.2 The Collared Coil Assembly (5) shall then be picked up with the crane using two slings so it remains level. It is then placed on the support blocks (7) so the coil retainer (6) is flush against the face plate (3).

5.1.3 The knurled reducer (4) is then screwed into the Mandrel (12) so the threaded adapter (8) can be screwed from the rods (2) to the reducer (4).

5.1.4 The Mandrel Puller (1) shall be warmed up about 20-30 minutes before pulling the Mandrel (12). The crane shall also be left on the slings with the Collared Coil Assembly during the pulling process.

5.1.5 Leads (13) shall be secured (cable tied) so they are out of the way during the process.

Technician(s) _____ Date 6/19/01

X 5.2 Perform an electrical inspection on each of the individual Inner and Outer Coils, Quadrants and Heaters. Refer to the Valhalla and Leader Free Standing Coil Measurement Procedure (ES-292306).

Note(s):

Coils in the free state during an electrical inspection shall be at least 150 mm (6") away from any conductive material (i.e., surface of the Coil preparation / storage table).

Electrical connections to the Coil leads shall be 305 mm ± 13 mm (12" ± .5") away from the end of the Coil to be tested.

Ensure that all measurements are recorded correctly, and have the proper value and symbol (i.e., mΩ, mH, etc.).

Caution:

Before applying power to the Valhalla 4300B, ensure that the test current is off.

During testing, ensure that the test current is off and the disconnect status safe light is lit while connecting and disconnecting test leads from the Coil Assembly. An unsafe signal indicates a test current is still being generated.

Valhalla 4300B settings:

Power must be on for 30 minutes before testing.

Test Current	_____	Off
Power	_____	On
Full Scale Voltage	_____	20mv
Amp Selector Knob	_____	.10 mA
Temperature Compensator	_____	On
Test Current	_____	On (testing)

Hp 4263B:

Function	_____	"Ls-Q" selected

Record the Serial Number of the test equipment used.

Valhalla _____

HP 4263b _____

Resistance Limits		Inner	Outer	Total	Pass	Fail
		240 mΩ to 265 mΩ	310 mΩ to 340 mΩ	550 mΩ to 605 mΩ		
Quadrant 1	Inner	.2592			✓	
	Outer		.3174		✓	
	Total			.5759	✓	
Quadrant 2	Inner	.2595			✓	
	Outer		.3209		✓	
	Total			.5779	✓	
Quadrant 3	Inner	.2566			✓	
	Outer		.3182		✓	
	Total			.5748	✓	
Quadrant 4	Inner	.2580			✓	
	Outer		.3229		✓	
	Total			.5811	✓	

MF 369581

Inductance Limits		Inner	Outer	Total	Pass	Fail
		575-620 mH	1.120 to 1.17 H	2.890 to 2.920 H		
Quadrant 1	Inner	2.34435 ~~584.705~~				
	Outer		880.707			
	Total			2.34435		
Quadrant 2	Inner	533.978				
	Outer		879.279			
	Total			2.33650		
Quadrant 3	Inner	532.686				
	Outer		875.962			
	Total			2.33427		
Quadrant 4	Inner	536.941				
	Outer		882.634			
	Total			2.34615		

(Q) Limits		Inner	Outer	Total	Pass	Fail
		3.3 to 3.7	4.8 to 5.3	4.5 to 5.2		
Quadrant 1	Inner	3.13				
	Outer		3.04			
	Total			5.30		
Quadrant 2	Inner	3.11				
	Outer		3.02			
	Total			5.27		
Quadrant 3	Inner	3.11				
	Outer		3.03			
	Total			5.28		
Quadrant 4	Inner	3.11				
	Outer		3.02			
	Total			5.27		

J.P.
Inspector

19 June 2001
Date

SNG

Electrical Test	Limit	Actual Measurement	Pass	Fail
Heater Strips 1/2 Resistance	9.20 to 9.60 Ω	9.396 Ω	✓	
Heater Strips 2/3 Resistance	9.20 to 9.60 Ω	9.469 Ω	✓	
Heater Strips 3/4 Resistance	9.20 to 9.60 Ω	9.446 Ω	✓	
Heater Strips 4/1 Resistance	9.20 to 9.60 Ω	9.389 Ω	✓	

Inspector

6/19/01
Date

X 5.3 Perform an Electrical inspection of the IORS Voltage Taps (Readings accurate ± 1mV).

Limit: No Opens

Inner	Valhalla Serial Number	Coil Serial Number	Reading
Quadrant 1	32-1318	MQXBI- 21	.2592 mV
Quadrant 2		MQXBI- 22	.2595 mV
Quadrant 3		MQXBI- 23	.2526 mV
Quadrant 4		MQXBI- 24	.2580 mV

Inspector

6/27/01
Date

X 5.4 Perform a Hipot on the Collared Coil Assembly (**Maximum Leakage 5μA**)

5 KV	Measurement(s)
Heater #1 to Ground 1/2	.2
Heater #2 to Ground 2/3	.2
Heater #3 to Ground 3/4	.2
Heater #4 to Ground 4/1	.2
Heater #1 to Coils	.3
Heater #2 to Coils	.2
Heater #3 to Coils	.2
Heater #4 to Coils	.2
Magnet to Ground	.02

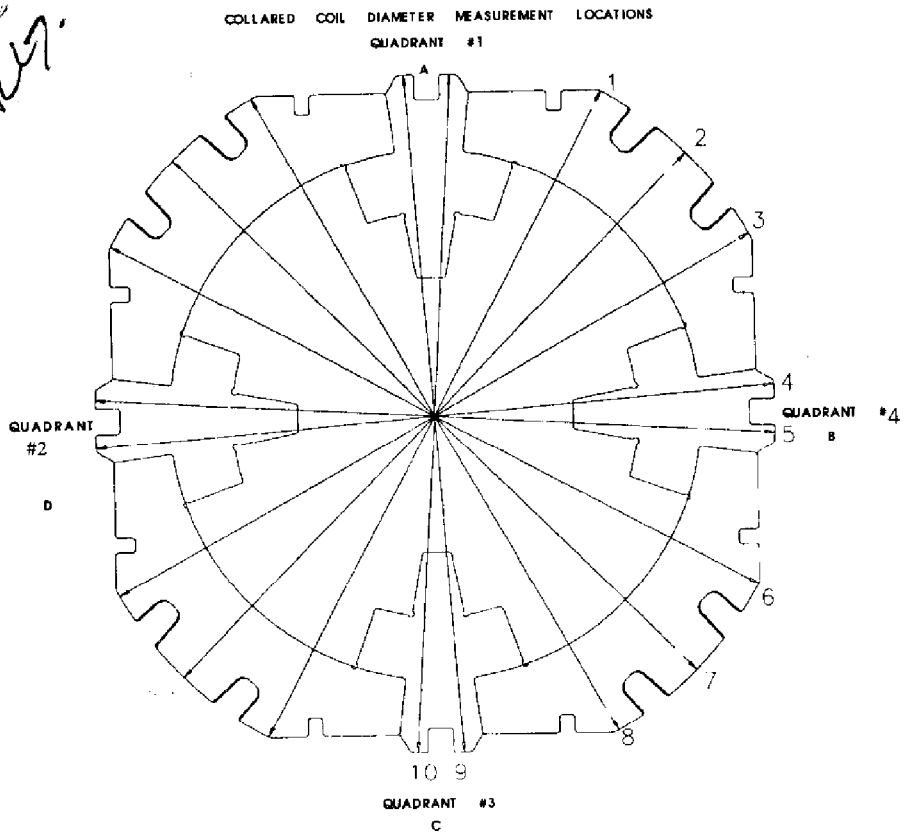
Coil to Coil 3.0 KV	Measurement(s)
Quadrant 1 to Quadrant 2	.1
Quadrant 2 to Quadrant 3	.1
Quadrant 3 to Quadrant 4	.1
Quadrant 4 to Quadrant 1	.1

[signature] 6/27/01

Inspector Date

X 5.5 Diameter Measuring Procedure (ES-344697).

NR. MEASUREMENTS TAKEN MANUALLY.



Looking from the Lead End

5.5.1 Using the Collared Coil Assembly Measuring Fixture, measure and record the dimension across the Collared Coil Assembly as shown at points 2, 4, 5, 7, 9 and 10.

5.5.2 Measurements are taken across the laminations.

5.5.3 Start at the Lead End of the Collared Coil Assembly.

5.5.4 Measurements along the length of the Collared Coil Assembly shall be taken at the Center of each lamination pack.

5.5.5 Insert computer printout of measurement at this page of the traveler.

5.5.6 Send an electronic copy of the computer-collected data to the Samsats II folder.

A Howell
Inspector

6/26/01
Date

STOP

5.6 Verify that the readings in Step 5.0 are acceptable.
Approved for next Major Assembly Procedure.

Responsible Authority/Physicist

6/26/01
Date

6.0 Production Complete

6.1 Process Engineering verify that the LHC Collared/Keying Traveler (5520-TR-333495) is accurate and complete. This shall include a review of all steps to ensure that all operations have been completed and signed off. Ensure that all Discrepancy Reports, Nonconformance Reports, Repair/Rework Forms, Deviation Index and dispositions have been reviewed by the Responsible Authority for conformance before being approved.

Comments:

Process Engineering/Designee

Date 6/26/01

TD/ENGINEERING & FABRICATION

PARTS KIT REQUEST

IMPORTANT NOTES:
1) MAGNET NUMBER MUST BE FILLED IN.
2) ONLY ONE FORM PER MAGNET.
3) PARTS COORDINATOR OR DESIGNEE MUST SIGN THIS FORM.
4) MATERIAL CONTROL WILL ISSUE PARTS AND RECORD ROUTING NUMBER.
5) ANY QUANTITIES NOT AVAILABLE WILL HAVE COMMENTS RETURNED TO THE PARTS COORDINATOR FOR REVIEW.

COLLARED COIL NUMBER: MQXBC-001

RELEASED BY | PRODUCTION SIGNATURE: T J Gardner

TODAYS DATE: 4-Jun-01

NEED DATE: ~~4~~ 5-Jun-01

DELIVER TO_____ICB

BUDGET CODE: LQC

ISSUE VERIFICATION

MATERIAL CONTROL SIGNATURE: [signature]

DATE ISSUED TO STOCKROOM: 6/4/01

THIS KIT LIST IS FOR:

ME-369581	*	COLLARED COIL ASSEMBLY

PART NUMBER	REV	DESCRIPTION	REQUIRED QTY/ASS'Y	MATERIAL CONTROL: QTY FILLED OUT BY STOCK ROOM ISSUED	ROUTE FORM	NOT AVAIL	FILLED OUT BY EXPEDITER DATE AVAIL	COMMENTS TO PRODUCTION MANAGER	PROD VERIFY PART	SUPT. VERIFY PART
MB-344450	E D	TAPERED KEY	272 EA	272	75089		6/4/01			
369576		SOLID PACK	498 EA	~~ICB HAS~~ 587	74900		↓	1 full skid 527		
~~369597~~		~~LAMINATION PACK~~	~~2~~ EA	ICB HAS						
MC-344150	*	INNER COIL ASSEMBLY	REF ONLY				—			
MC-344151	*	OUTER COIL ASSEMBLY	REF ONLY				—			

RETURN THIS COMPLETED PARTS KIT REQUEST WITH THE ISSUED PARTS TO THE PARTS COORDINATOR.

[signature] 6/5/01 STOCKROOM SIGNATURE AND DATE

TRAVELER NO. TR-333495

KIT IS COMPLETE (PARTS COORDINATOR SIGNATURE): [signature] BADGE # 4589

DATE 25 JUN 01

MQXB01 Collar Deflection Measurements - Manual measurement

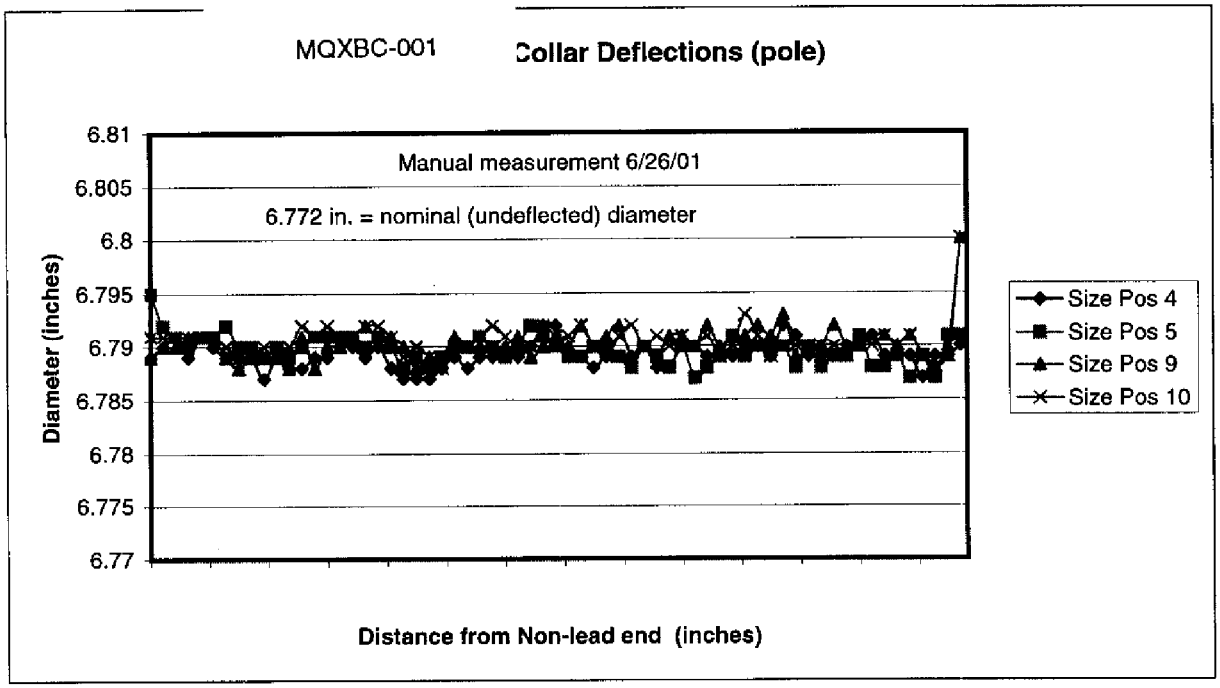
Measurements taken D. Bice, J. Page & P. Mayer 6/26/01

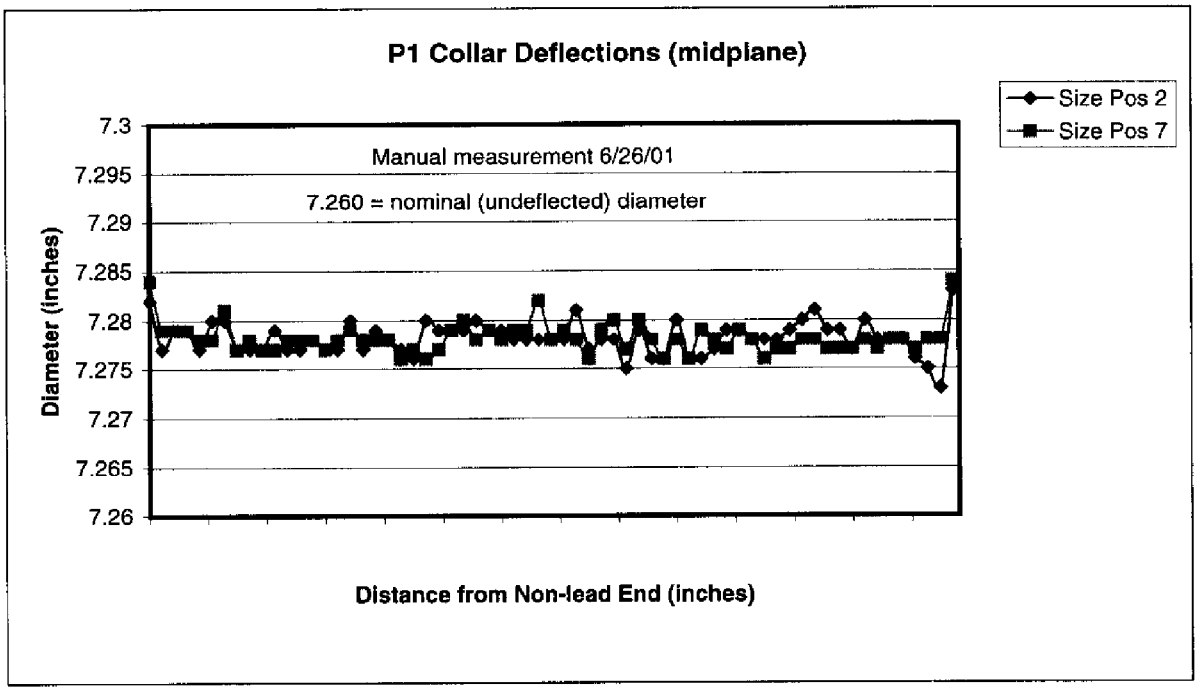
Inches from Return End	Size Pos 2	Size Pos 7	Inches from Return End	Size Pos 4	Size Pos 5	Size Pos 9	Size Pos 10
0.0	7.282	7.284	0.0	6.789	6.795	6.789	6.791
3.2	7.277	7.279	3.2	6.79	6.792	6.79	6.791
6.4	7.279	7.279	6.4	6.791	6.791	6.79	6.791
9.6	7.279	7.279	9.6	6.789	6.79	6.791	6.791
12.8	7.277	7.278	12.8	6.791	6.791	6.791	6.791
16.1	7.28	7.278	16.1	6.79	6.791	6.791	6.791
19.3	7.28	7.281	19.3	6.789	6.792	6.789	6.79
22.5	7.277	7.277	22.5	6.789	6.79	6.788	6.789
25.7	7.277	7.278	25.7	6.789	6.79	6.789	6.789
28.9	7.277	7.277	28.9	6.787	6.789	6.789	6.79
32.1	7.279	7.277	32.1	6.789	6.79	6.789	6.79
35.3	7.277	7.278	35.3	6.788	6.789	6.788	6.79
38.5	7.277	7.278	38.5	6.788	6.79	6.791	6.792
41.7	7.278	7.278	41.7	6.789	6.791	6.788	6.791
44.9	7.277	7.277	44.9	6.789	6.791	6.79	6.792
48.2	7.277	7.278	48.2	6.79	6.791	6.79	6.791
51.4	7.28	7.279	51.4	6.79	6.791	6.791	6.791
54.6	7.277	7.278	54.6	6.789	6.79	6.792	6.792
57.8	7.279	7.278	57.8	6.79	6.791	6.791	6.792
61.0	7.278	7.278	61.0	6.788	6.79	6.791	6.791
64.2	7.277	7.276	64.2	6.787	6.788	6.79	6.789
67.4	7.276	7.277	67.4	6.787	6.789	6.788	6.79
70.6	7.28	7.276	70.6	6.787	6.788	6.789	6.789
73.8	7.279	7.277	73.8	6.788	6.789	6.789	6.788
77.0	7.279	7.279	77.0	6.789	6.79	6.791	6.79
80.3	7.279	7.28	80.3	6.788	6.79	6.79	6.79
83.5	7.28	7.278	83.5	6.789	6.791	6.79	6.791
86.7	7.279	7.279	86.7	6.789	6.79	6.79	6.792
89.9	7.279	7.278	89.9	6.789	6.789	6.79	6.791
93.1	7.278	7.279	93.1	6.789	6.79	6.791	6.79
96.3	7.278	7.279	96.3	6.79	6.792	6.789	6.79
99.5	7.278	7.282	99.5	6.792	6.791	6.79	6.792
102.7	7.278	7.278	102.7	6.792	6.79	6.791	6.791
105.9	7.278	7.279	105.9	6.789	6.789	6.79	6.791
109.1	7.281	7.278	109.1	6.789	6.789	6.792	6.792
112.4	7.277	7.276	112.4	6.788	6.79	6.79	6.79
115.6	7.278	7.279	115.6	6.789	6.79	6.791	6.789
118.8	7.278	7.28	118.8	6.789	6.789	6.792	6.791
122.0	7.275	7.277	122.0	6.789	6.788	6.789	6.792
125.2	7.279	7.28	125.2	6.79	6.79	6.79	6.79
128.4	7.276	7.278	128.4	6.788	6.789	6.789	6.791
131.6	7.276	7.276	131.6	6.788	6.788	6.791	6.79
134.8	7.28	7.278	134.8	6.79	6.79	6.791	6.791
138.0	7.276	7.276	138.0	6.79	6.787	6.79	6.79
141.2	7.276	7.279	141.2	6.789	6.788	6.792	6.791
144.5	7.277	7.278	144.5	6.789	6.789	6.79	6.789
147.7	7.279	7.277	147.7	6.789	6.791	6.791	6.79
150.9	7.279	7.279	150.9	6.79	6.789	6.791	6.793
154.1	7.278	7.278	154.1	6.79	6.79	6.792	6.791
157.3	7.278	7.276	157.3	6.789	6.79	6.791	6.789
160.5	7.278	7.277	160.5	6.792	6.79	6.793	6.79
163.7	7.279	7.277	163.7	6.791	6.788	6.789	6.79

166.9	7.28	7.278	166.9	6.789	6.79	6.79	6.79
170.1	7.281	7.278	170.1	6.789	6.788	6.79	6.79
173.3	7.279	7.277	173.3	6.789	6.789	6.792	6.79
176.6	7.279	7.277	176.6	6.79	6.789	6.79	6.789
179.8	7.277	7.277	179.8	6.79	6.791	6.79	6.791
183.0	7.28	7.278	183.0	6.791	6.788	6.791	6.79
186.2	7.278	7.277	186.2	6.789	6.788	6.791	6.791
189.4	7.278	7.278	189.4	6.789	6.789	6.79	6.79
192.6	7.278	7.278	192.6	6.789	6.787	6.791	6.791
195.8	7.276	7.277	195.8	6.787	6.789	6.789	6.789
199.0	7.275	7.278	199.0	6.789	6.787	6.788	6.788
202.2	7.273	7.278	202.2	6.789	6.791	6.789	6.79
205.4	7.283	7.284	205.4	6.79	6.791	6.8	6.8
Mean	7.278	7.278		6.789	6.789	6.790	6.790
	Size Pos 2	Size Pos 7		Size Pos 4	Size Pos 5	Size Pos 9	Size Pos 10
Nominal	7.26	7.26		6.772	6.772	6.772	6.772
Mean Defl.	0.0180	0.0180		0.0172	0.0173	0.0182	0.0184
Defl. um	458	456		436	440	462	468

If we assume the prestress is 1.55 uM per MPa, based on the radial deflections at the midplane, the preload from collar deflections is 228uM / 1.55uM per Mpa = 147MPa = 21400psi

This does not reflect adjustments for actual collar size.


MQXBC-001
Collar Deflections (pole)
Manual measurement 6/26/01
6.772 in. = nominal (undeflected) diameter
Diameter (inches)
6.81
6.805
6.8
6.795
6.79
6.785
6.78
6.775
6.77
Size Pos 4
Size Pos 5
Size Pos 9
Size Pos 10
Distance from Non-lead end (inches)


P1 Collar Deflections (midplane)
Manual measurement 6/26/01
7.260 = nominal (undeflected) diameter
Diameter (inches)
7.3
7.295
7.29
7.285
7.28
7.275
7.27
7.265
7.26
Size Pos 2
Size Pos 7
Distance from Non-lead End (inches)

1) Traveler Title:	2) Specification No.:	3) Revision:	4) DR No.:
LHC Collaring & Keying	5520-TR-333495	A	HGQ-0232

5) Step No.:	6) Drawing No. & Revision:	7)Routing No.:	8)Component/Item/Batch/Lot No.:	9)Serial No.:
3.6	MD-369581	#Name?	MQXBC-001	MQXBC-001

10) Nonconformance Description by First Hand Observer: ☐ Class I ☑ Class II

Collar packs not installed per assembly drawing. Inner and Outer cap gage packs installed at lead end. Cap gage packs installed approximately 2.5" from the back of the lead end keys.

11) Name: Jim Rife Date: 6/14/01

12) Cause of Nonconformance:

Derision was made to measure preload with cap gauges in this magnet (during assembly only).

13) Responsible Authority Rodger Rut Date: 6/14/01

14) Disposition:

Use cap gauges, Then cut wires after keying

13) Responsible Authority Rodger Rut Date: 6/14/01

15) Corrective Action to Prevent Recurrence:

Cap gauges will not be used in future magnets.

13) Responsible Authority Rodger Rut Title: Engineer Date: 6/14/01

16) Corrective Action/Disposition Verified By:

Rodger Rut

13) Responsible Authority Date: 6/14/01

[ ] Class I [X] Class II

Will Configuration be affected? [ ] Yes [X] No

17) Reviewed By:

Bob Jones 7/18/01

Process Engineering Manager Date:

18) ☐ Material ☐ Manpower ☑ Method ☐ Machine ☐ Measurement

Process Engineering determine (identify), appropriate problem area and check.

JUL 18 2001

Instructions for the completion of the Discrepancy Report Form

Definition:
>>Discrepancy Report - A form used to report all Class I & Class II problems (Discrepancies).

Process Engineering Responsibility:
>> Process Engineering - Maintains and Controls the Group's Discrepancy Report and Control Log.

1. Traveler Title - Enter the title of the Traveler at the point the Discrepancy was found.
2. Enter the Specification Number in place at the time of the Discrepancy.
3. Enter the Revision in place at the time of the Discrepancy.
4. DR Number - Enter the next number from the control log that is maintained by Process Engineering.
5. Step No. - Record the step in the Traveler where the Discrepancy was found or the process stopped. Attach a copy of traveler page (s) or the process description as appropriate or required to clarify the condition.
6. Drawing No. & Revision - Reference the applicable drawing that describes the item or condition.
7. If part is defective, record Routing No. from Parts Kit.
8. Enter - The Component/Item/Batch/Lot Number - (an identification Number assigned to the Item).
9. Enter - The Serial Number - (an identification Number assigned to the Item).
10. Nonconformance Description by First Hand Observer - Enter a brief and concise description of those actions, conditions, or facts that result in a nonconforming condition along with the reason it is out of specification. This is done by the person that observed the condition and is assisted by a Process Engineering Technician or Production Supervisor.
11. Enter Name, Title, Date - the First Hand Observer, his /her job title and the date the condition was observed.
12. Cause of Nonconformance - Enter the agreed event or condition that rendered the item unacceptable for use. If unable to determine the cause at this time, state "Unknown" with an explanation.
13. Responsible Authority - That person in charge of the area or activity in question states the cause and disposition of the nonconforming condition and verifies that the Corrective Action and Disposition have been completed. Before closing the report he determines if the configuration of the component/item is effected and if the nonconforming condition is Class I or II.

    CONFIGURATION - The physical and functional characteristics of a Component/Item, including the materials, parts and limit criteria that are "frozen" in the design documents.

    CLASS I - A major problem that affects configuration, performance, form, fit, function, reliability or safety, significant cost or schedule increase.

    CLASS II - A minor problem that is not Class I, but can be eliminated by approved repair or rework that when completed in an acceptable manner will bring the nonconforming condition into compliance with the design requirements.

14. Disposition - A plan by the Responsible Authority that will render the item or condition acceptable for use. This may be use-as-is, rework, repair, replace, substitute or scrap along with details.
15. Corrective Action to Prevent Recurrence - Those actions necessary to correct, minimize or eliminate the cause from repeating itself in the process, work instructions, work practices, inspections, drawing, tools, equipment or materials, etc.
16. Corrective Action/Disposition Verified - To be signed after the Cause, Disposition and Corrective Action to Prevent Recurrence have been put into place or completed.
17. Reviewed By: - The Process Engineering Manager performs a review of the report to assure proper completion; that the Corrective Action to Prevent Recurrence and Disposition have been completed and are acceptable.
18. Process Engineering determine (identify), appropriate problem area.

1) Traveler Title:	2) Specification No.:	3) Revision:	4) DR No.:
LHC Collaring & Keying	5520-TR-333495	A	HGQ-0233

5) Step No.:	6) Drawing No. & Revision:	7)Routing No.:	8)Component/Item/Part #	
5.4	ME-369581	#Name?	MQXBC-001	MQXBC-001

10) Nonconformance Description by First Hand Observer: ☐ Class I ☑ Class II

During hipot testing the coil was found to have a coil to ground short at 4.5 Kv.

11) Name: Jim Rife Date: 6/21/01

12) Cause of Nonconformance:

During keying, the 2nd collar lamination from the lead end cut through all the ground wrap, contacting the coil on the outer coil pole turn.

13) Responsible Authority Rodger R_t Date: 6-26-01

14) Disposition:

Remove the last three lead end laminations. GE Varnish the area that was shorted and place kapton over it. Add three specially made small laminations (M -369) in the pole area on all four quadrants. Install end can in a position three laminations back longitudinally from the normal position.

13) Responsible Authority Rodger R_t Date: 6-26-01

15) Corrective Action to Prevent Recurrence:

1.) Add several tapped holes to each end of assembly mandrel to allow temporary pole inserts to be placed near the ends during coil assembly. This will allow ground wrap to be placed more accurately before collar laminations are installed.
2.) Round edges of last collar lamination to relieve pressure in that area.

13) Responsible Authority Rodger R_t Title: Engineer Date: 6-26-01

16) Corrective Action/Disposition Verified By:

Rodger R_t 6-26-01

13) Responsible Authority Date: 6-26-01

[ ] Class I [X] Class II

Will Configuration be affected? [ ] Yes [X] No

17) Reviewed By:

Bob [illegible] 7/18/01

Process Engineering Manager Date:

18) ☐ Material ☐ Manpower ☐ Method ☐ Machine ☑ Measurement

Process Engineering determine (identify), appropriate problem area and check.

JUL 18 2001

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5. Step No. - Record the step in the Traveler where the Discrepancy was found or the process stopped. Attach a copy of traveler page (s) or the process description as appropriate or required to clarify the condition.
6. Drawing No. & Revision - Reference the applicable drawing that describes the item or condition.
7. If part is defective, record Routing No. from Parts Kit.
8. Enter - The Component/Item/Batch/Lot Number - (an identification Number assigned to the Item).
9. Enter - The Serial Number - (an identification Number assigned to the Item).
10. Nonconformance Description by First Hand Observer - Enter a brief and concise description of those actions, conditions, or facts that result in a nonconforming condition along with the reason it is out of specification. This is done by the person that observed the condition and is assisted by a Process Engineering Technician or Production Supervisor.
11. Enter Name, Title, Date - the First Hand Observer, his /her job title and the date the condition was observed.
12. Cause of Nonconformance - Enter the agreed event or condition that rendered the item unacceptable for use. If unable to determine the cause at this time, state "Unknown" with an explanation.
13. Responsible Authority - That person in charge of the area or activity in question states the cause and disposition of the nonconforming condition and verifies that the Corrective Action and Disposition have been completed. Before closing the report he determines if the configuration of the component/item is effected and if the nonconforming condition is Class I or II.

    CONFIGURATION - The physical and functional characteristics of a Component/Item, including the materials, parts and limit criteria that are "frozen" in the design documents.

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15. Corrective Action to Prevent Recurrence - Those actions necessary to correct, minimize or eliminate the cause from repeating itself in the process, work instructions, work practices, inspections, drawing, tools, equipment or materials, etc.
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17. Reviewed By: - The Process Engineering Manager performs a review of the report to assure proper completion; that the Corrective Action to Prevent Recurrence and Disposition have been completed and are acceptable.
18. Process Engineering determine (identify), appropriate problem area.

1) Traveler Title:	2) Specification No.:	3) Revision:	4) DR No.:
LHC Collaring & Keying	5520-TR-333495	A	HGQ-0235

5) Step No.:	6) Drawing No. & Revision:	7)Routing No.:	8)Component/Item/Batch
5.2	ME 369581		MQXBC-001

10) Nonconformance Description by First Hand Observer: ☐ Class I ☑ Class II

Inductance and "Q" readings are out of the limits set for them.

11) Name: Steve Gould Date: 6/27/01

12) Cause of Nonconformance:

Limits were set based on previous coils and have too small a range.

13) Responsible Authority Roger Rt Date: 6/27/01

14) Disposition:

Continue with magnet.

13) Responsible Authority Roger Rt Date: 6/27/01

15) Corrective Action to Prevent Recurrence:

Change traveler to adjust range.

R. Bossert + M. Cullen to develop appropriate range J. Blowers 7/5/2001

TR1192

13) Responsible Authority Roger Rt Title: Engineer Date: 6-27-01

16) Corrective Action/Disposition Verified By:	17) Reviewed By:
Roger Rt	Jami Blowers
13) Responsible Authority Date: 6/27/01	Process Engineering Manager Date: 05/July/2001
[ ] Class I [X] Class II	
Will Configuration be affected? [ ] Yes [X] No	

18) ☐ Material ☐ Manpower ☐ Method ☐ Machine ☒ Measurement

Process Engineering determine (identify), appropriate problem area and check.

JUL 9 2001

1) Traveler Title:	2) Specification No.:	3) Revision:	4) DR No.:
LHC Collaring & Keying	5520-TR-333495	A	HGQ-0238

5) Step No.:	6) Drawing No. & Revision:	7)Routing No.:	8)Component/Item/Batch/I
5.2	ME-369581		MQXBC-001

10) Nonconformance Description by First Hand Observer: ☐ Class I ☑ Class II

L & Q readings are out of the predetermined limits.

11) Name: Steve Gould Date: 7/23/2001

12) Cause of Nonconformance:

Incorrect limits used in traveler

13) Responsible Authority Rodger Rut Date: 7/23/2001

14) Disposition:

Use coil as is. Coil performs per ~~dss~~ expectations.

13) Responsible Authority Rodger Rut Date: 7/23/2001

15) Corrective Action to Prevent Recurrence:

Modify traveler to incorporate correct limits.

TRR 1192

13) Responsible Authority Rodger Rut Title: Engineer Date: 7/23/2001

16) Corrective Action/Disposition Verified By:

Rodger Rut

13) Responsible Authority Date: 7/23/2001

[ ] Class I [X] Class II

Will Configuration be affected? [ ] Yes [X] No

17) Reviewed By:

Jami Blanco 8/13/01

Process Engineering Manager Date:

18) ☐ Material ☐ Manpower ☐ Method ☐ Machine ☒ Measurement

Process Engineering determine (identify), appropriate problem area and check.

AUG 14 2001